

REMARKS

Claims 54-56, 58-72, 74-82, 105-111 and 115-120 are pending. Claim 65 is currently amended to include the subject matter of claim 73 (now canceled). Claim 72 is currently amended to address a 35 U.S.C. § 112 1st Paragraph rejection. No new matter is added and therefore no new search is required. Applicant respectfully requests entry of the amendments which should place the claims in condition for allowance or in better condition for appeal.

As a preliminary matter, Applicant thanks the Examiner for allowing claims 54-56, 58-64, 105-111 and 115-120.

Examiner Interview

Applicant thanks the Examiner for participating in a telephone call with the Applicant's representative on October 26, 2007 in which the Examiner clarified that arguments used in the rejection of claim 73 do not also apply to claims 54-56, 58-64 and 74-82 as indicated by the Office action.

35 U.S.C. § 112 1st Paragraph Rejection

Claim 72 was rejected for failing to comply with the written description requirement. Applicant has amended claim 72 to address that issue and respectfully requests withdrawal of the claim rejection.

Declaration Under 37 CFR § 1.131

In response to the Office action of March 26, 2007, Applicant submitted a declaration under 37 CFR § 1.131 and a corresponding exhibit asserting, among other things, the subject matter of pending claims 65-73 was invented by the Applicant prior to the effective filing date of the Ermer et al. patent (U.S. Patent No. 6,380,601).

A subsequent final Office action maintained the rejection of claims 65-73 and alleged that the declaration was deficient because it did not support the subject matter of those claims (*see* final Office action, pgs. 4-5). In particular, the final Office action alleged that the process

data for layer #10 in the attached exhibit contradicts the statement of section 24 of the declaration, which states that a layer of GaAs is grown over a layer of InGaP. The Office action alleged that the exhibit instead shows a non-zero flow of trimethylindium which would lead to the formation of InGaAs and not GaAs as claimed. Applicant respectfully submits that the Office action's interpretation of the exhibit is incorrect.

Applicant directs the Examiner to page 3 of the exhibit and more specifically to the row located directly under the row labeled "TMAI." As shown in that row for layer #10, a letter "I" is used to indicate that the state of the process gas flow in that step is "idle." In other words, the process gas trimethylindium is not used in that deposition step, even though a flow rate of 400 ccm is shown. Therefore, as a result of the execution of the steps set forth for layer #10, a layer of GaAs is indeed formed over a layer of InGaP, as stated in the declaration.

Accordingly, the declaration and the accompanying exhibit establish that the subject matter of each of claims 65-72 was invented prior to the filing date of the Ermer et al. patent and, therefore, the Ermer et al. patent is not prior art to the Applicant's invention.

In view of the foregoing reason, Applicant respectfully requests withdrawal of the rejection of claims 65-67, 69 and 71-72 under 35 U.S.C. § 102 as anticipated by the Ermer et al. patent.

For the same reason, Applicant requests withdrawal of the rejection of claims 65-72 under 35 U.S.C. § 103 as unpatentable over the Ermer et al. patent in view of the Wiesmann patent (U.S. Patent No. 4,634,605) and the Stanberry patent (U.S. Patent No. 4,322,571).

Claims 65-73

Claims 65 and 71 were rejected under 35 U.S.C. § 103 as unpatentable over Olson (U.S. Patent No. 5,342,453).

Claim 72 was rejected under 35 U.S.C. § 103 as unpatentable over the Olson patent in view of Friedman et al. ("Back Surface Fields for GaInP₂ Solar Cells," IEEE, (1991), pp. 358-360).

Independent claim 65 is currently amended to include the subject matter of claim 73 (now canceled) and recites, in part, a solar cell that includes a germanium substrate, a barrier layer directly overlying and contacting the substrate to inhibit the diffusion of arsenic into the

germanium substrate and a “two step diffusion profile in the germanium substrate with two different dopants.”

In contrast, neither the Olson patent nor the Friedman et al. reference, alone or in combination, discloses or renders obvious the subject matter of pending claim 65.

The Olson patent discloses a heterojunction solar cell that can include a germanium substrate and a GaInP₂ passivating layer disposed over the substrate. The Olson patent does not disclose or suggest, however, a “two step diffusion profile in [a] germanium substrate with two different dopants” as recited by pending claim 65. Instead, the Olson patent merely discloses the substrate includes a “high dopant concentration” (*see* col. 3, lines 65-66). There is no disclosure or suggestion in the Olson patent of a “two step diffusion profile” or “two different dopants” in a germanium substrate.

The Friedman et al. reference discloses a GaInP₂ solar cell that includes a GaAs substrate and a GaInP₂ back surface field layer (*see* FIG. 1) but fails to disclose the features missing from the Olson patent.

At least for the foregoing reasons, claim 65 should be allowed.

Claims 66-72 depend from claim 65 and should be allowed for at least the same reasons as claim 65.

Claims 74-82

Claims 74-76 and 78-82 were rejected under 35 U.S.C. § 103 as unpatentable over Chiang (“Experimental Results of GaInP₂/GaAs/Ge Triple Junction Cell Development for Space Power Systems,” 25th IEEE PVSC, May 13-17, 1996, pp. 183-186) in view of the Wiesmann patent.

Claim 77 was rejected under 35 U.S.C. § 103 as unpatentable over the Chiang reference in view of the Wiesmann patent and further in view of the Friedman reference.

In rejecting independent claim 74, the Office action alleges that arsenic and phosphorous are “functional equivalents,” and, therefore, it would have been obvious to one of ordinary skill in the art to modify the arsenic only diffusion region of the Chiang reference to include both

arsenic and phosphorous in the manner recited by claim 74 (*see* final Office action, pg. 10). Applicant respectfully disagrees.

Regarding the combination of equivalents, The MPEP states "It is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose." (MPEP § 2144.06, emphasis added)

Even if arsenic and phosphorous are functional equivalents, which Applicant does not concede, the combination of arsenic and phosphorous atoms as disclosed and claimed in the present application is not used for the "very same purpose" as arsenic or phosphorous atoms alone. Instead, given the different diffusion rates of arsenic and phosphorous atoms, they are used respectively to form two distinct diffusion profiles. The combination of the two distinct diffusion profiles results in an overall two-step diffusion profile in the germanium substrate that helps improve carrier collection. The two-step diffusion profile is reflected in claim 74, which recites "the upper portion" of the diffusion region "has a higher concentration of phosphorous atoms than arsenic atoms." None of the cited references discloses or suggests using arsenic or phosphorous for that purpose, much less a structure having a diffusion region in which the "upper portion" has a higher concentration of phosphorous atoms than arsenic atoms as recited by claim 74. Therefore, it would not have been obvious to combine arsenic and phosphorous atoms in the Chiang reference in the manner recited by claim 74.

The Office action also alleges that it would have been well within the skill of the artisan to have used "much more phosphorous atoms than arsenic atoms throughout the diffusion region (including the upper portion), with the expectation that an n-doped germanium layer diffusion layer would be obtained in a working solar cell." Applicant respectfully disagrees.

The "expectation of a working cell" in this case is not a sufficient reason as to why one of ordinary skill would have been motivated to modify the cell of the Chiang reference in the manner recited by claim 74. Based on the disclosure of the Chiang reference, a person of ordinary skill in the art would understand that the cell disclosed in that reference is already working. Accordingly, it does not make any sense why "the expectation of a working cell" could be used as a reason to modify an already working device. Indeed, in the absence of the present

disclosure, one of ordinary skill in the art would not have been inclined to include phosphorous atoms as this would require one or more additional processing steps which would increase fabrication time and cost.

The Office action further alleges that there is no structural distinction between the claimed structure and that of the prior art combination of the Chiang reference and the Wiesmann patent. This is incorrect. Neither of the cited references discloses or suggests "an upper portion" of a diffusion region having "a higher concentration of phosphorous atoms than arsenic atoms" as recited by claim 74. Therefore, even if the references were combined as suggested by the Examiner, they would fail to include this structural feature.

The Friedman et al. reference discloses a GaInP₂ solar cell that includes a GaAs substrate and a GaInP₂ back surface field layer (*see* FIG. 1) but fails to disclose the features missing from the Chiang reference and the Wiesmann patent.

At least for the foregoing reasons, claim 74 should be allowed.

Claims 75-82 depend from claim 74 and should be allowed for at least the same reasons as claim 74.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Applicant : Mark A. Stan et al.
App. No. : 09/885,319
Filed : June 19, 2001
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Attorney's Docket No.: 21167-013001 / 1003

No fee is believed due. However, please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: 4/9/07



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